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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/790,142	03/02/2004	Tomonari Sendai	Q80102	3042

23373 7590 10/05/2006

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EXAMINER	
LEE, SHUN K	

ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 10/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/790,142	SENDAI ET AL.	
	Examiner	Art Unit	
	Shun Lee	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 June 2006 and 20 July 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *12-23 and 31-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *12-19* is/are allowed.

6)☒ Claim(s) *20-23 and 31-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 20, 22, 31, and 33 are rejected under 35 U.S.C. 102(a) as being anticipated by Farrokhnia *et al.* (US 6,694,047).

In regard to claim **20**, Farrokhnia *et al.* disclose a medical image processing apparatus for evaluating image quality of a radiation image obtained by using a radiation imaging system, thereby performing inspection of said radiation imaging system, said medical image processing apparatus comprising:

(a) position detecting means (column 10, line 63 to column 11, line 20; column 11, line 44 to column 12, line 51) for detecting, when image data representing a radiation image obtained by imaging a phantom having an image quality evaluating pattern as to at least one image quality evaluation item and a plurality of markers respectively disposed at a plurality of positions different from each other by using said radiation imaging system is inputted, a position of said phantom in said radiation image by using said plurality of markers;

(b) comparison and calculating means (column 12, lines 52-63) for comparing the position of said phantom detected by said position detecting means with a

reference position of said phantom in said radiation image to calculate an amount, of difference in a linear direction and a rotational direction;

(c) search area changing means (column 12, line 64 to column 13, line 16) for changing a search area, which is a region within said radiation image to be measured as to a predetermined image quality evaluation item, on the basis of the amount of difference in the linear direction and the rotational direction calculated by said comparison and calculating means;

(d) physical amount calculating means (column 13, line 46 to column 15, line 60) for performing measurement as to said predetermined image quality evaluation item within the search area changed by said search area changing means, and calculating a physical amount representing characteristic of said radiation image;

(e) determination criterion changing means (column 13, line 46 to column 15, line 60) for changing a determination criterion to be used for determining the image quality of said radiation image, on the basis of the amount of difference in the linear direction and the rotational direction calculated by said comparison and calculating means; and

(f) determination means (column 13, line 46 to column 15, line 60) for determining the image quality of said radiation image by using said physical amount calculated by said physical amount calculating means, on the basis of the determination criterion changed by said determination criterion changing means.

In regard to claim **22**, Farrokhnia *et al.* disclose a medical image processing apparatus for evaluating image quality of a radiation image obtained by using a

radiation imaging system, thereby performing inspection of said radiation imaging system, said medical image processing apparatus comprising:

(a) position detecting means (column 10, line 63 to column 11, line 20; column 11, line 44 to column 12, line 51) for detecting, when image data representing a radiation image obtained by imaging a phantom having an image quality evaluating pattern as to at least one image quality evaluation item and a plurality of markers respectively disposed at a plurality of positions different from each other by using said radiation imaging system is inputted, a position of said phantom in said radiation image by using said plurality of markers;

(b) comparison and calculating means (column 12, lines 37-51) for comparing the position of said phantom detected by said position detecting means with a reference position of said phantom in said radiation image to calculate an amount of difference in a linear direction and a rotational direction;

(c) image correcting means (column 12, lines 37-51) for correcting the position of said phantom in said radiation image so that the amount of difference in the linear direction and the rotational direction calculated by said comparison and calculating means is reduced;

(d) physical amount calculating means (column 13, line 46 to column 15, line 60) for performing measurement with respect to an image of said phantom, of which position is corrected by said image correcting means, as to a predetermined image quality evaluation item, and calculating a physical amount representing characteristic of said radiation image; and

(e) determination means (column 13, line 46 to column 15, line 60) for determining the image quality of said radiation image on the basis of the physical amount calculated by said physical amount calculating means.

In regard to claim **31**, Farrokhnia *et al.* disclose a method of evaluating image quality of a radiation image obtained by using a radiation imaging system, thereby inspecting said radiation imaging system, said method comprising the steps of:

(a) inputting an image data representing a radiation image obtained by radiation imaging of a phantom having an image quality evaluating pattern as to at least one image quality evaluation item and a plurality of markers respectively disposed at a plurality of positions different from each other (column 2, line 66 to column 3, line 17);

(b) detecting a position of said phantom in said radiation image by using said plurality of markers on the basis of the image data inputted at step (a) (column 10, line 63 to column 11, line 20; column 11, line 44 to column 12, line 51);

(c) comparing the position of said phantom detected at step (b) with a reference position of said phantom in said radiation image to calculate an amount of difference in a linear direction and a rotational direction (column 12, lines 52-63);

(d) changing a search area, which is a region within said radiation image to be measured as to a predetermined image quality evaluation item, on the basis of the amount of difference in the linear direction and the rotational direction calculated at step (c) (column 12, line 64 to column 13, line 16);

(e) performing measurement in the search area changed at step (d) as to said image quality evaluation items, and calculating a physical amount representing characteristic of said radiation image (column 13, line 46 to column 15, line 60);

(f) changing a determination criterion to be used for evaluating the image quality of said radiation image on the basis of the amount of difference in the linear direction and the rotational direction calculated at step (c) (column 13, line 46 to column 15, line 60); and

(g) evaluating the image quality of said radiation image by using the physical amount calculated at step (e) on the basis of the determination criterion changed at step (f) (column 13, line 46 to column 15, line 60).

In regard to claim **33**, Farrokhnia *et al.* disclose a method of evaluating image quality of a radiation image obtained by using a radiation imaging system, thereby inspecting said radiation imaging system, said method comprising the steps of:

(a) inputting an image data representing a radiation image obtained by radiation imaging of a phantom having an image quality evaluating pattern as to at least one image quality evaluation item and a plurality of markers respectively disposed at a plurality of positions different from each other (column 2, line 66 to column 3, line 17);

(b) detecting a position of said phantom in said radiation image by using said plurality of markers on the basis of the image data inputted at step (a) (column 10, line 63 to column 11, line 20; column 11, line 44 to column 12, line 51);

(c) comparing the position of said phantom detected at step (b) with a reference position of said phantom in said radiation image to calculate an amount of difference in a linear direction and a rotational direction (column 12, lines 37-51);

(d) correcting the position of said phantom in said radiation image so that the amount of difference in the linear direction and the rotational direction calculated at step (c) is reduced (column 12, lines 37-51);

(e) performing measurement with respect to the image of said phantom, of which position has been corrected at step (d), as to a predetermined image quality evaluation item, and calculating a physical amount representing characteristic of said radiation image (column 13, line 46 to column 15, line 60); and

(f) determining the image quality of said radiation image on the basis of the physical amount calculated at step (e) (column 13, line 46 to column 15, line 60).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 21, 23, 32, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farrokhnia *et al.* (US 6,694,047) in view of Lang (US 2002/0067798).

In regard to claim **21** (which is dependent on claim 20), claim **23** (which is dependent on claim 22), claim **32** (which is dependent on claim 31), and claim **34** (which is dependent on claim 33), the apparatus and method of Farrokhnia *et al.* lacks control means for controlling notification of a maintenance center of existence of an abnormality when the determination means has determined that abnormality of the image quality exists in said radiation image. Lang teaches (paragraphs 7-23) that x-ray images and/or data (*e.g.*, calibration images and associated data) can be distributed over a network to a variety of different recipients for further analysis and/or action. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide a control means for controlling notification which is connected to a network in the apparatus and method of Farrokhnia *et al.*, in order to distribute x-ray images and/or data to a variety of different recipients (*e.g.*, a maintenance center) for further analysis and/or action.

Allowable Subject Matter

6. Claims 12-19 are allowed.

7. The following is a statement of reasons for the indication of allowable subject matter: the instant application is deemed to be directed to an nonobvious improvement

over the invention patented in US Patent 6,231,231 (Farrokhnia *et al.*). The improvement comprises in combination with other recited elements, determination means for determining the image quality of said radiation image on the basis of measurement result obtained by said measuring means and the inspection result inputted by using an inputting means to be used for inputting inspection result as to said predetermined image quality evaluation item obtained by visually observing the displayed or outputted radiation image as recited in claims 12-19.

Response to Arguments

8. Applicant's arguments filed 21 June 2006 have been fully considered but they are not persuasive.

Applicant argues (second paragraph on pg. 10 to fourth paragraph on pg. 11 of remarks filed 21 June 2006) that the express limitation of calculating of an amount of difference in a linear and rotational direction is not disclosed in the cited prior art. Examiner respectfully disagrees. Farrokhnia *et al.* state (column 7, lines 26-35) that "The fiducials 240 may thus aid in determining the orientation and positioning of the coupon phantom 200 as well as aid in separating and locating the various sub-phantoms. ... For example, a phantom measuring parameters A and B may have a different shape, size and orientation of fiducials than a phantom measuring parameters B and C" and (column 11, lines 36-39) that "Although the location of the perimeter ring has been determined at step 710, the location of the other phantom components is not necessarily known due to errors in positioning and rotation, for example". The key phrase is "orientation and positioning". That is, "positioning" is a linear direction and

"orientation" is a rotational direction. Farrokhnia *et al.* also state (column 12, lines 52-63) that " ... Because the locations of the vertical and horizontal line segments are known and the spatial relationship of the vertical and horizontal lines on the phantom is also known, the aspect ratio of the tracked vertical and horizontal line segments may be compared with the aspect ratio of the physical phantom". Therefore, Farrokhnia *et al.* disclose (column 12, lines 52-63) a comparison and calculating means for comparing the position of said phantom detected by said position detecting means with a reference position of said phantom in said radiation image to calculate an amount, of difference in a linear direction and a rotational direction (*i.e.*, difference from the known spatial relationship comprising orientation and positioning on the phantom).

Applicant argues (fifth paragraph on pg. 11 of remarks filed 21 June 2006) that there is no reliance on a difference in both a linear and a rotational direction in the cited art. Examiner respectfully disagrees. The specification (last paragraph on pg. 34) discloses that "At step S6, the measuring region calculating section 404 calculates positions of the images of image quality measuring patterns (pattern images), which are used for quantitative evaluation, on the recording sheet 10 (hereinafter, a region including the positions is referred to as measuring region). In this embodiment, in the patterns used for the quantitative evaluation, there are included the copper step patterns 25, the edge detecting patterns 26, and copper scale patterns 28 as shown in FIG. 3. The information about the positions of these patterns in the case where no position difference is generated (hereinafter, a region including the positions is referred to as reference region), i.e., the coordinates of the start point and the end point of pixels

corresponding to the reference region are previously recorded in the parameter file recording section 412. The measuring region calculating section 404 calculates the measuring region in the actually obtained radiation image based on the position difference of the phantom image, which is calculated at step S5, and the above-mentioned information about the reference region. The method of calculating the measuring region will be described later". Further, Farrokhnia *et al.* state (column 12, line 64 to column 13, line 16) that " ... If the vertical and horizontal line segments are not straight, then polynomial warping is employed to develop a working estimate for the line segment and the ROIs are positioned relative to the working estimate ... ". Therefore, Farrokhnia *et al.* disclose (column 12, line 64 to column 13, line 16) a search area changing means for changing a search area, which is a region (*i.e.*, ROIs) within said radiation image to be measured as to a predetermined image quality evaluation item, on the basis of the amount of difference in the linear direction and the rotational direction (*i.e.*, difference from the known line segment spatial relationships comprising orientation and positioning on the phantom) calculated by said comparison and calculating means.

Applicant argues (last paragraph on pg. 11 of remarks filed 21 June 2006) that there is no reliance on a difference in both a linear and a rotational direction in the cited art. Examiner respectfully disagrees. The specification (last paragraph on pg. 64) discloses that "Next, at step S41, the CPU 440 reads out the correcting program from the determination criterion-correcting program recording section 451 and carries out the correcting program. That is to say, the determination criterion changing section 441 reads out the determination criterion of the pattern image from the determination

criterion recording section 452, and based on the amount of position difference of the phantom image (refer to FIGS. 11A and 11B) in the parallel direction and rotational direction, and changes the determination criterion for evaluating the pattern image. Further, at step S42, the determination section 442 evaluates the physical amount with respect to the pattern image, which has been calculated in the measuring section 405, based on the changed determination criterion. ... ". Thus the specification teaches to use a changed determination criterion (*i.e.*, measuring region 33 in Fig. 11b) instead of an initial determination criterion (*i.e.*, measuring region 32 in Fig. 11a). Further, Farrokhnia *et al.* state (column 13, line 46 to column 15, line 60) that " ... Once the ROIs for the phantom have been determined, the high and low intensity regions 180, 185 are measured at step 1710 ... ". Therefore, Farrokhnia *et al.* disclose (column 13, line 46 to column 15, line 60) a determination criterion changing means for changing a determination criterion to be used (*i.e.*, the determined ROIs) for determining the image quality of said radiation image, on the basis of the amount of difference in the linear direction and the rotational direction (*i.e.*, difference from the known line segment spatial relationships comprising orientation and positioning on the phantom) calculated by said comparison and calculating means.

Applicant appears to argue (second and third paragraphs on pg. 12 of remarks filed 21 June 2006) that a prior art passage cannot be cited as disclosing more than one structure. Examiner respectfully disagrees. It should be noted that a single sentence can disclose multiple distinct structures. As discussed above, the determination criteria changing means is disclosed within the passage cited in the prior office action. Further,

Farrokhnia *et al.* state (column 13, line 46 to column 15, line 60) that " ... Next, at step 1730, the contrast detail sub-phantom is used to measure the contrast of the x-ray system. Turning to FIG. 15, the mean value inside the small square ROIs inside the circular apertures and the mean value insides the rectangular ROIs are computed. The difference between the mean values inside the square ROIs and the rectangular ROIs is the contrast of the x-ray system. The contrast noise ratio may also be determined by dividing the contrast by the standard deviation of the pixels from inside that ROI ... ". Therefore, Farrokhnia *et al.* disclose (column 13, line 46 to column 15, line 60) determination means for determining the image quality (*e.g.*, contrast) of said radiation image by using said physical amount (*e.g.*, mean value) calculated by said physical amount calculating means, on the basis of the determination criterion (*i.e.*, the determined ROIs such as the small square ROIs inside the circular apertures) changed by said determination criterion changing means.

Applicant argues (fourth paragraph on pg. 12 of remarks filed 21 June 2006) that Applicant's prior comments with regard to the "comparison and calculating means" would also apply to claims 22 and 33 because it is expressly limited to a calculation of an amount difference in a linear direction and rotational direction. Examiner respectfully disagrees for the reasons discussed above.

Applicant argues (last paragraph on pg. 12 to second paragraph on pg. 13 of remarks filed 21 June 2006) that the cited art does not disclose that the amount of difference in the linear direction and the rotational direction calculated by said comparison and calculating means is reduced. Examiner respectfully disagrees.

Farrokhnia *et al.* state (column 12, lines 37-51) that " ... The polynomial warping may be used to generate a "best fit" among the registration points which may then be mapped to the stored physical model of the phantom ... ". Therefore, Farrokhnia *et al.* disclose (column 12, lines 37-51) an image correcting means for correcting the position of said phantom in said radiation image so that the amount of difference in the linear direction and the rotational direction (*i.e.*, difference from the known line segment spatial relationships comprising orientation and positioning on the phantom) calculated by said comparison and calculating means is reduced (*i.e.*, best fit).

Applicant argues (seventh and eighth paragraphs on pg. 13 of remarks filed 21 June 2006) that the Lang reference does not remedy the basic deficiencies already cited in the parent claims with regard to Farrokhnia *et al.* Examiner respectfully disagrees for the reasons discussed above.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439. The examiner can normally be reached on Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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